Westport ISX G

Natural Gas Vehicle Technology Forum

Downey, CA - November 20th 2008

Westport™

Creating a Better World
through Innovative Energy Solutions

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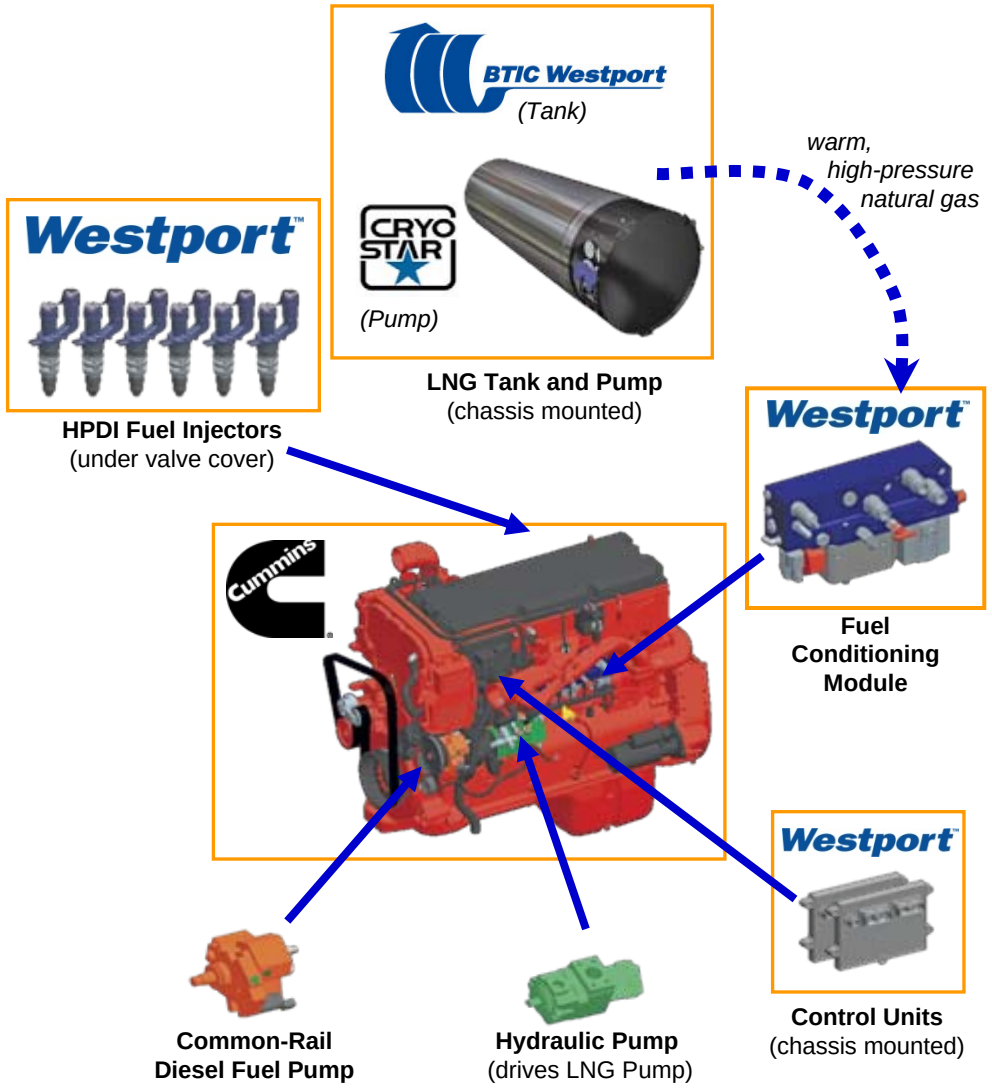
Global Leader in Alternative Fuel Heavy-Duty Transportation Technologies

- Founded 1995 – UBC technology
- A world leader in heavy-duty gaseous fuel engine technology
  (natural gas, hydrogen, LPG, biogas)
- ~270 employees worldwide
- C$71.5 million Revenue in FY08
- Global partnerships with OEMs

Westport ISX G and LNG Fuel System

- Proprietary and patented technology launched in 2007
- Based on the Cummins ISX
- Only heavy-duty truck natural gas engine in the world with diesel-equivalent performance
  - Cleaner than diesel, lower lifecycle cost and 20% less greenhouse gas emissions
  - Adaptable to other alternative fuels such as Hydrogen
- Available today
- Development agreements signed with Weichai and leading European OEM



Westport HPDI Technology

High Pressure Direct Injection

- Compression ignition – no spark plug
  - Pilot diesel injected to provide energy for auto-ignition of natural gas injection
- Natural gas injected at high pressure at end of compression stroke
  - no pre-mixed air/fuel
- Low diesel usage under all conditions
- Diesel Engine Performance remains
  - Same high power and torque
  - Same or higher efficiency

Diesel HPDI

Typical In-Cylinder Reductions

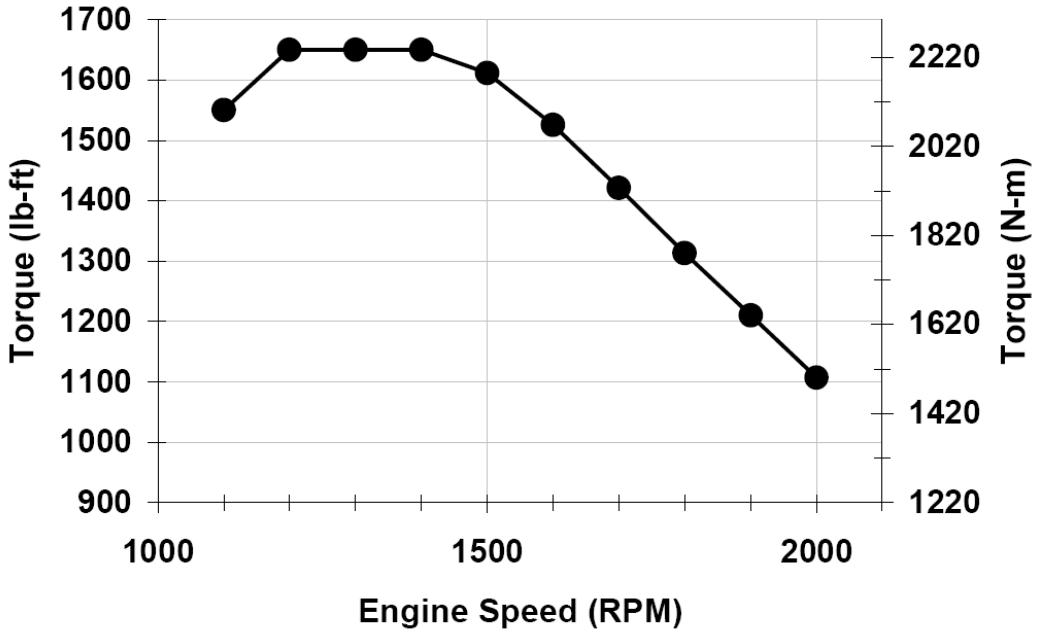
- **~ 30% lower NOx**
- **~ 60% lower PM**
- **~ 20% lower GHG**

Westport ISX G

- Liquefied Natural Gas (LNG) Fuelled Heavy-Duty engine based on Cummins ISX
- 4 engine ratings
- CARB and EPA certified
  - NOx = 0.8 g/bhp-hr
  - PM = 0.01 g/bhp-hr
  - GHG benefit 20%

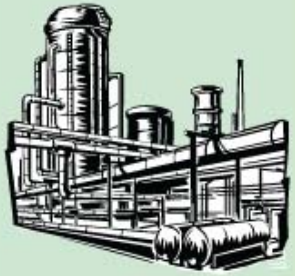
Engine Model	Advertised Horsepower (hp)	Peak Torque (lb-ft)
450ST	450	1,550 / 1,750 @ 1,200 RPM
450	450	1,650 @ 1,200 RPM
400ST	400	1,450 / 1,650 @ 1,200 RPM
400	400	1,450 @ 1,200 RPM

Performance – Torque



- Torque curve conforms with selected diesel ratings (450/1650 shown)
- Provides compatibility with diesel drive train components
- No change in cooling requirements vs. base diesel

LNG Heavy-Duty Truck
Well to Wheel GHG Emissions (BC)

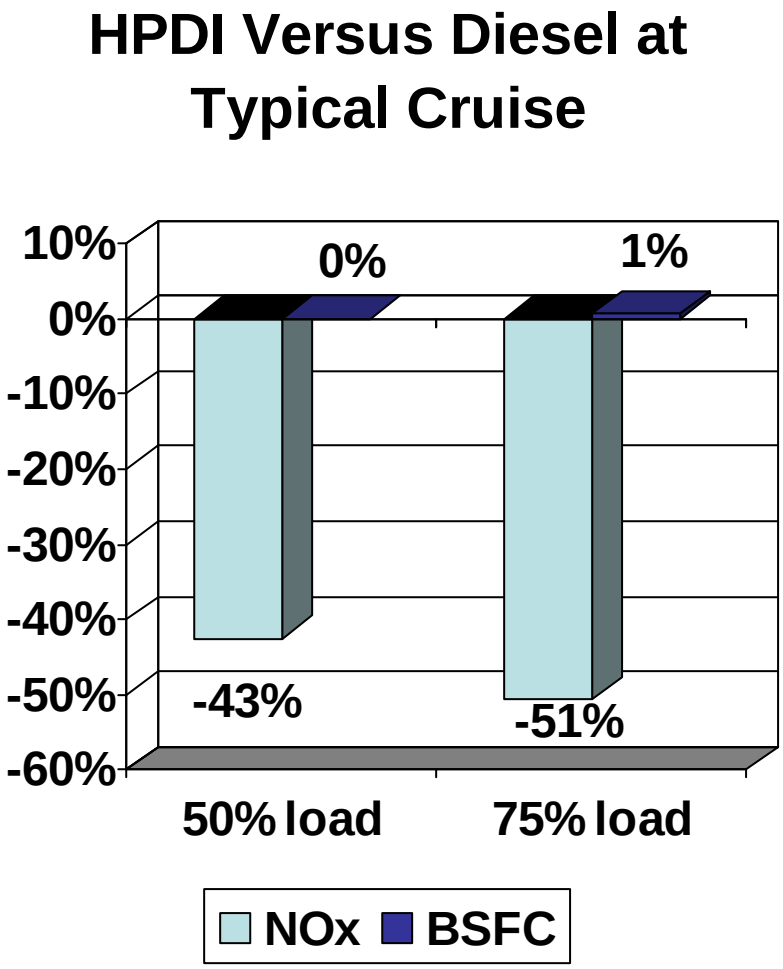
	Extraction	Processing	Fueling, transportation and storage	Emissions at end use	**Total life cycle**
Natural gas (LNG)	 **78 g/km**	 **36 g/km**	 **150 g/km**	 **824 g/km**	**1088 g/km**
Diesel	 **227 g/km**	 **130 g/km**	 **12 g/km**	 **1114 g/km**	**1483 g/km**

Source: NRCAN GHGenius Model and Terasen (March 2008)

26.6% reduction

Fuel Economy

- Fuel consumption map essentially same as Cummins ISX
- Fuel consumption over emissions test protocols within a few percent of diesel values
- Tuned to match diesel at key cruise modes
- In-use testing has proven that Westport ISX G matches efficiency of diesel trucks in the same application



Experience

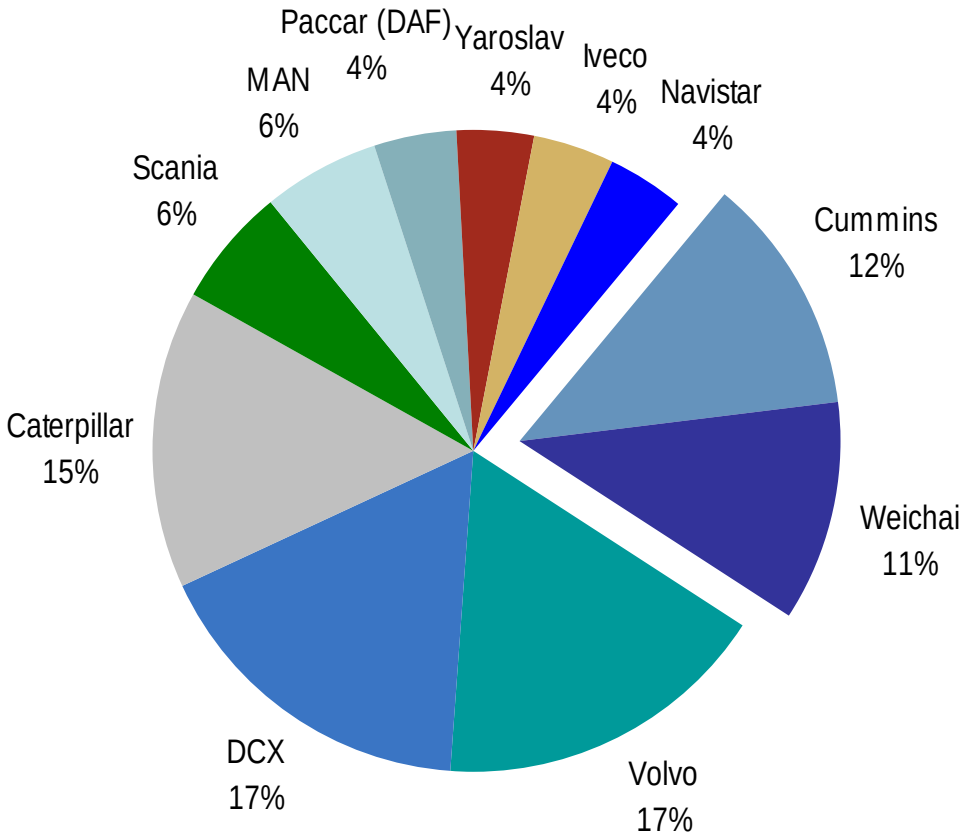
- Proof of Concept (2001-present)
  - Norcal fleet in San Fran (: 6,200,000+ miles)
- Current Product (Field trial and commercial)

  2,000,000+ miles accumulated to date
  - Vehicles up to 215,000 lbs (Australia)

Key Relationships with Leading Heavy-Duty Engine OEMS

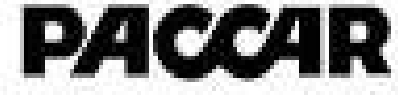
- Partnerships with Cummins, Weichai, and a leading European OEM give us alliance with a market share leader in each of North America, Asia and Europe
- Current HPDI alliances have approximately 40% global market share for diesel engines

Heavy Duty Engine Market Share (2005)



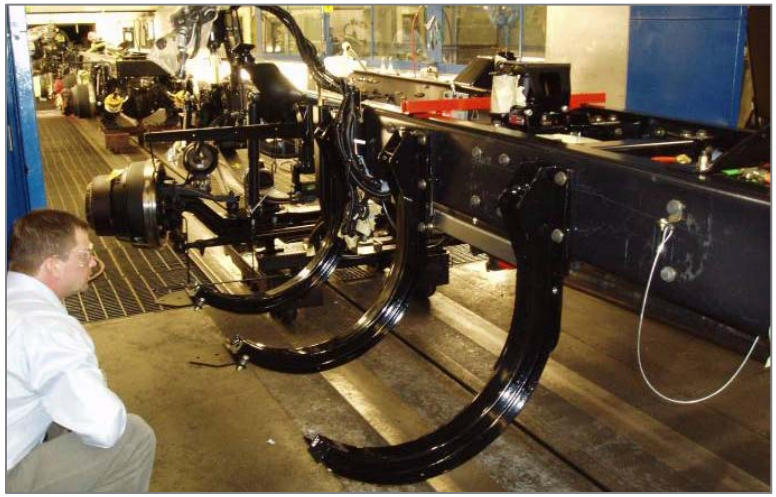
Source: Volvo AB investor presentation dated November 8, 2006

PACCAR Factory Production



- Kenworth offering four configurations of on-line product based on T800 chassis for 2009
- Peterbilt to offer three new LNG configurations on three models (387, 386 and 367) in 2009
- Westport Assembly Center opened to support on-line production volumes
  - First engines from new facility have been built and delivered

OEM Heavy-Duty Truck Production
Kenworth Truck Factory



Immediate R&D Focus

- Increase OEM availability
  - Working with a number of OEMs, too early in the process to share details
- Maintain robust product
- Further reduce emissions
- Improve fuel economy
- Cost reduction
  - Volume driven
  - Platform sharing

2010 Approach

- Maintain current core product
  - Major LNG fuel system components
- Use common aftertreatment technology
  - Selective Catalytic Reduction (SCR)
  - Not using credits to meet 2010 standard
- SCR capabilities will allow engine-out NOx to increase slightly from current product
  - Efficiency gains
  - Similar to diesel DEF consumption

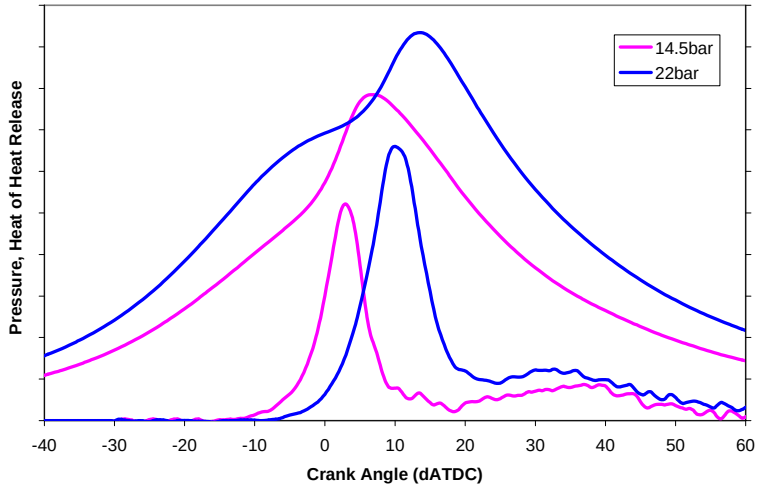
2010 and Beyond

- WTW GHG emissions are a function of fuel type, fuel use and DEF consumption
  - Westport GHG advantage maintained in 2010

- No engineering required for biogas or liquid biomethane (LBM) that meets fuel specifications

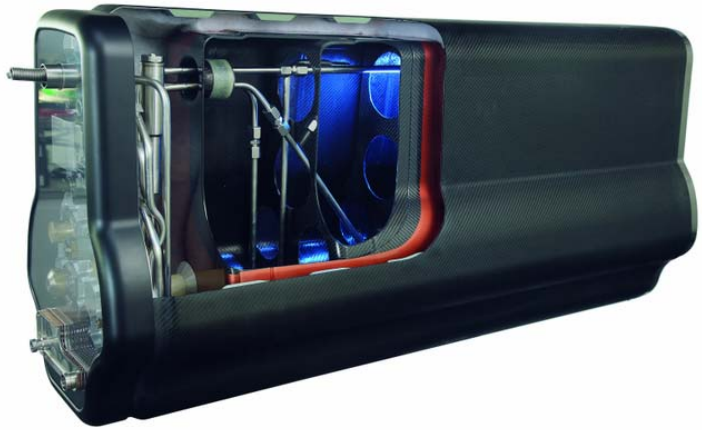
Potential of Greater DOE R&D Focus

- Commercialization of PCCI combustion techniques for natural gas
  - Remove the need for NOx aftertreatment at 2010 levels



HCDI Combustion Traces

- Development of lower cost, lighter weight and more package efficient LNG tanks for HD
  - Improve flexibility and economics of LNG trucks



Composite LH_2 Storage Tank (BMW et al.)

FOR MORE INFORMATION

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